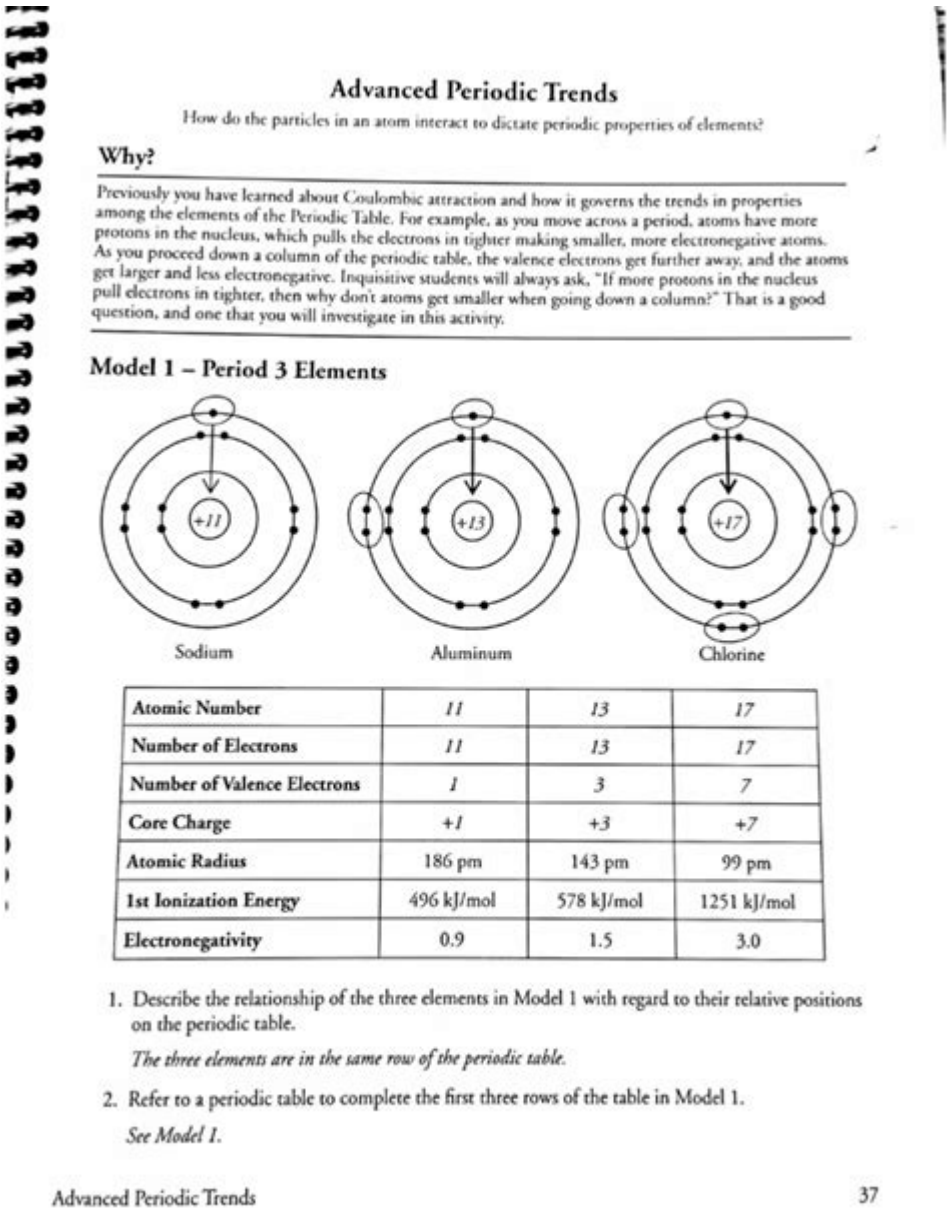
Pogil Periodic Trends



Advanced Periodic Trends

How do the particles in an atom interact to dictate periodic properties of elements?

Why?

Previously you have learned about Coulombic attraction and how it governs the trends in properties among the elements of the Periodic Table. For example, as you move across a period, atoms have more protons in the nucleus, which pulls the electrons in tighter making smaller, more electronegative atoms. As you proceed down a column of the periodic table, the valence electrons get further away, and the atoms get larger and less electronegative. Inquisitive students will always ask, "If more protons in the nucleus pull electrons in tighter, then why don't atoms get smaller when going down a column?" That is a good question, and one that you will investigate in this activity.

Model 1 – Period 3 Elements

Sodium Aluminum Chlorine

Atomic Number	*11*	*13*	*17*
Number of Electrons	*11*	*13*	*17*
Number of Valence Electrons	*1*	*3*	*7*
Core Charge	*+1*	*+3*	*+7*
Atomic Radius	186 pm	143 pm	99 pm
1st Ionization Energy	496 kJ/mol	578 kJ/mol	1251 kJ/mol
Electronegativity	0.9	1.5	3.0

1. Describe the relationship of the three elements in Model 1 with regard to their relative positions on the periodic table.

   The three elements are in the same row of the periodic table.

2. Refer to a periodic table to complete the first three rows of the table in Model 1.

   See Model 1.

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POGIL Periodic Trends: Mastering the Periodic Table's Patterns

Are you struggling to grasp the fascinating patterns and trends within the periodic table? Does memorizing elements feel like an uphill battle? Fear not! This comprehensive guide delves into the world of POGIL (Process-Oriented Guided Inquiry Learning) activities related to periodic trends, providing a structured approach to mastering this essential chemistry concept. We'll break down key trends, explain their underlying principles, and offer practical strategies for applying your knowledge. Get ready to unlock the secrets of the periodic table and achieve a deeper understanding

of atomic behavior!

Understanding Periodic Trends: A Foundation

The periodic table, far from being a static grid of elements, showcases remarkable trends in atomic properties. These trends are directly linked to the arrangement of electrons in an atom's electron shells and the resulting forces of attraction and repulsion. Understanding these trends is crucial for predicting element behavior and understanding chemical reactivity. POGIL activities provide a hands-on approach to learning these trends, moving beyond rote memorization to a deeper conceptual understanding.

Key Periodic Trends Explored in POGIL Activities:

Atomic Radius: This refers to the size of an atom. POGIL activities often explore how atomic radius varies across periods (rows) and down groups (columns) of the periodic table, explaining the influence of effective nuclear charge and shielding effect.

Ionization Energy: The energy required to remove an electron from an atom is ionization energy. POGIL exercises help understand the factors affecting ionization energy, such as nuclear charge, electron shielding, and electron configuration. Trends across periods and down groups will be highlighted and explained.

Electron Affinity: This describes the energy change when an atom gains an electron. POGIL activities can explore the variations in electron affinity, linking them to an atom's electron configuration and its tendency to accept electrons.

Electronegativity: This measures an atom's ability to attract electrons in a chemical bond. POGIL-style questions and activities encourage students to analyze electronegativity differences and predict the type of bonding (ionic, covalent) between atoms.

How POGIL Activities Enhance Understanding of Periodic Trends

POGIL's process-oriented approach promotes active learning and critical thinking. Instead of passively receiving information, students actively engage with the material through collaborative problem-solving and guided inquiry. Here's how POGIL aids in mastering periodic trends:

1. Collaborative Learning:

Working in groups fosters discussion and allows students to explain their reasoning to peers, solidifying their understanding. Explaining concepts to others is a powerful way to reinforce

learning.

2. Guided Inquiry:

POGIL activities often present a series of carefully designed questions and challenges that lead students to discover the trends themselves. This discovery-based approach enhances retention and comprehension.

3. Problem-Solving:

POGIL activities frequently involve applying the concepts of periodic trends to solve real-world problems or predict the behavior of elements in various chemical scenarios.

4. Conceptual Understanding:

By focusing on the "why" behind the trends, POGIL activities cultivate a deep conceptual understanding rather than simply memorizing facts.

Effective Strategies for Utilizing POGIL in Periodic Trends

To maximize the benefits of POGIL activities for periodic trends, consider these strategies:

Pre-reading: Encourage students to review the relevant textbook sections before the activity to provide a foundation for the guided inquiry process.
Active Participation: Stress the importance of active participation during group discussions and problem-solving sessions.
Instructor Facilitation: Instructors should act as facilitators, guiding students through the activities rather than directly providing answers.
Post-Activity Discussion: Dedicate time for a class discussion to summarize key findings and address any lingering questions.
Application to Real-World Scenarios: Relate the learned trends to real-world applications, making the learning more engaging and meaningful.

Conclusion

Mastering periodic trends is crucial for success in chemistry. POGIL activities offer a powerful tool to move beyond rote memorization and foster a deep, conceptual understanding of these fundamental patterns. By actively engaging with the material through collaborative problem-solving and guided inquiry, students can unlock the secrets of the periodic table and develop a robust understanding of atomic behavior. Remember to embrace the collaborative spirit, actively participate in discussions, and apply your knowledge to real-world problems to achieve a true mastery of periodic trends.

Frequently Asked Questions (FAQs)

1. What are the most common types of POGIL activities used for periodic trends? Common activities include analyzing data sets showing atomic radii, ionization energies, etc., predicting properties based on trends, and explaining observed trends using electron configurations and effective nuclear charge.

2. Can POGIL activities be used for all levels of chemistry students? Yes, POGIL activities can be adapted to suit various levels of student understanding, from introductory to advanced chemistry courses.

3. How can I find POGIL activities specifically focusing on periodic trends? You can search online resources like the POGIL Project website or university chemistry websites for downloadable activities. Many textbooks also include POGIL-style exercises.

4. What are the limitations of using POGIL activities alone? While highly beneficial, POGIL activities are most effective when used in conjunction with other teaching methods like lectures and demonstrations to provide a comprehensive learning experience.

5. How can I assess student learning after a POGIL activity on periodic trends? Assessment can involve written quizzes, group presentations summarizing their findings, individual problem-solving tasks, or a combination of these approaches.

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plan, organizing your study time, and getting the most out or your AP course. You'll get help understanding atomic structure and bonding, grasping atomic geometry, understanding how colliding particles produce states, and so much more. To provide students with hands-on experience, AP chemistry courses include extensive labwork as part of the standard curriculum. This is why the book dedicates a chapter to providing a brief review of common laboratory equipment and techniques and another to a complete survey of recommended AP chemistry experiments. Two full-length practice exams help you build your confidence, get comfortable with test formats, identify your strengths and weaknesses, and focus your studies. You'll discover how to Create and follow a pretest plan Understand everything you must know about the exam Develop a multiple-choice strategy Figure out displacement, combustion, and acid-base reactions Get familiar with stoichiometry Describe patterns and predict properties Get a handle on organic chemistry nomenclature Know your way around laboratory concepts, tasks, equipment, and safety Analyze laboratory data Use practice exams to maximize your score Additionally, you'll have a chance to brush up on the math skills that will help you on the exam, learn the critical types of chemistry problems, and become familiar with the annoying exceptions to chemistry rules. Get your own copy of AP Chemistry For Dummies to build your confidence and test-taking know-how, so you can ace that exam!

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break the material down and master it. The flexible order of topics allows unit conversions to be covered either early in the course (as is traditionally done) or later, allowing for a much earlier than usual description of elements, compounds, and chemical reactions. The text and superb illustrations provide a solid conceptual framework and address misconceptions. The book helps students to develop strategies for working problems in a series of logical steps. The Examples and Exercises give plenty of confidence-building practice; the end-of-chapter problems test the student's mastery. The system of objectives tells the students exactly what they must learn in each chapter and where to find it.

pogil periodic trends: Discipline-Based Education Research National Research Council, Division of Behavioral and Social Sciences and Education, Board on Science Education, Committee on the Status, Contributions, and Future Directions of Discipline-Based Education Research, 2012-08-27 The National Science Foundation funded a synthesis study on the status, contributions, and future direction of discipline-based education research (DBER) in physics, biological sciences, geosciences, and chemistry. DBER combines knowledge of teaching and learning with deep knowledge of discipline-specific science content. It describes the discipline-specific difficulties learners face and the specialized intellectual and instructional resources that can facilitate student understanding. Discipline-Based Education Research is based on a 30-month study built on two workshops held in 2008 to explore evidence on promising practices in undergraduate science, technology, engineering, and mathematics (STEM) education. This book asks questions that are essential to advancing DBER and broadening its impact on undergraduate science teaching and learning. The book provides empirical research on undergraduate teaching and learning in the sciences, explores the extent to which this research currently influences undergraduate instruction, and identifies the intellectual and material resources required to further develop DBER. Discipline-Based Education Research provides guidance for future DBER research. In addition, the findings and recommendations of this report may invite, if not assist, post-secondary institutions to increase interest and research activity in DBER and improve its quality and usefulness across all natural science disciples, as well as guide instruction and assessment across natural science courses to improve student learning. The book brings greater focus to issues of student attrition in the natural sciences that are related to the quality of instruction. Discipline-Based Education Research will be of interest to educators, policy makers, researchers, scholars, decision makers in universities, government agencies, curriculum developers, research sponsors, and education advocacy groups.

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embedded track. The report considers the characteristics and interfaces of vehicle wheels and rail, tracks and wheel gauges, rail sections, alignments, speeds, and track moduli. The report includes chapters on vehicles, alignment, track structures, track components, special track work, aerial structures/bridges, corrosion control, noise and vibration, signals, traction power, and the integration of LRT track into urban streets.

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pogil periodic trends: *Second International Handbook of Science Education* Barry J. Fraser, Kenneth Tobin, Campbell J. McRobbie, 2011-12-13 The International Handbook of Science Education is a two volume edition pertaining to the most significant issues in science education. It is a follow-up to the first Handbook, published in 1998, which is seen as the most authoritative resource ever produced in science education. The chapters in this edition are reviews of research in science education and retain the strong international flavor of the project. It covers the diverse theories and methods that have been a foundation for science education and continue to characterize this field. Each section contains a lead chapter that provides an overview and synthesis of the field and related chapters that provide a narrower focus on research and current thinking on the key issues in that field. Leading researchers from around the world have participated as authors and consultants to produce a resource that is comprehensive, detailed and up to date. The chapters provide the most recent and advanced thinking in science education making the Handbook again the most authoritative resource in science education.

pogil periodic trends: *Introduction to Materials Science and Engineering* Elliot Douglas, 2014 This unique book is designed to serve as an active learning tool that uses carefully selected information and guided inquiry questions. Guided inquiry helps readers reach true understanding of concepts as they develop greater ownership over the material presented. First, background information or data is presented. Then, concept invention questions lead the students to construct their own understanding of the fundamental concepts represented. Finally, application questions provide the reader with practice in solving problems using the concepts that they have derived from their own valid conclusions. KEY TOPICS: What is Guided Inquiry?; What is Materials Science and

Engineering?; Bonding; Atomic Arrangements in Solids; The Structure of Polymers; Microstructure: Phase Diagrams; Diffusion; Microstructure: Kinetics; Mechanical Behavior; Materials in the Environment; Electronic Behavior; Thermal Behavior; Materials Selection and Design. MasteringEngineering, the most technologically advanced online tutorial and homework system available, can be packaged with this edition. MasteringEngineering is designed to provide students with customized coaching and individualized feedback to help improve problem-solving skills while providing instructors with rich teaching diagnostics. Note: If you are purchasing the standalone text (ISBN: 0132136422) or electronic version, MasteringEngineering does not come automatically packaged with the text. To purchase MasteringEngineering, please visit: www.masteringengineering.com or you can purchase a package of the physical text + MasteringEngineering by searching the Pearson Higher Education web site. MasteringEngineering is not a self-paced technology and should only be purchased when required by an instructor. MARKET: For students taking the Materials Science course in the Mechanical & Aerospace Engineering department. This book is also suitable for professionals seeking a guided inquiry approach to materials science.

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